

San José State University SJSU ScholarWorks

The Scientist

College of Science

Spring 1-1-2008

The Scientist, Spring 2008

San Jose State University, College of Science

Follow this and additional works at: <http://scholarworks.sjsu.edu/scientist>

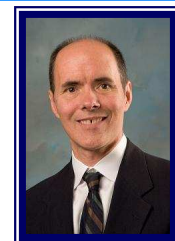
Recommended Citation

San Jose State University, College of Science, "The Scientist, Spring 2008" (2008). *The Scientist*. Book 2.
<http://scholarworks.sjsu.edu/scientist/2>

This Newsletter is brought to you for free and open access by the College of Science at SJSU ScholarWorks. It has been accepted for inclusion in The Scientist by an authorized administrator of SJSU ScholarWorks. For more information, please contact scholarworks@sjsu.edu.

THE SCIENTIST

MESSAGE FROM THE DEAN



Inside this issue:

Message from the Dean	1
Geology: The Millers	2
Michael Graham: Kelp Discovery	2
Physics and Astronomy 2007 Highlights	3
Mathematics News and updates	4
Physics of Animation	5
Physics and Astronomy Cont'd.	6
Chemistry: John Logan & Polymers	7
Bob Bornstein wins Helmut Lang Award	8
Biodiversity Center	9
Late Breaking News	10
COS Advising Center	10
New Faculty	11
Provost's Outstanding Assesment	11
Professor of the Year	12
\$2M STEP Grant	12

It's been a busy year here at the College of Science. Building on the great work of a planning team made up of faculty, staff, and students that met at a retreat at Asilomar a year ago, we have nearly finalized plans for a College-wide advising center, which we hope will turn into a one-stop-shop for students in all departments of the college. This project, along with other initiatives promoting and tracking student success in the College of Science, will be supported by a five year, \$2 Million STEP (Science Technology Engineering and Mathematics Talent Pool Expansion) grant from the National Science Foundation that was awarded to Associate Deans Maureen Scharberg and Dan Walker.

Another grant promoting student success, a National Institute of Health RISE (Research Initiative for Scientific Advancement) that was awarded to Drs. Karen Singmaster and Herb Silber in the Department of Chemistry. This grant, which is aimed at bringing more minority students into science Ph.D. programs, continues the excellent programs these two dedicated scholars have already established for minority students.

I am also very pleased to announce that Dr. Singmaster has been designated the SJSU Professor of the Year, a well deserved honor recognizing her years of selfless dedication to our students, as well as her remarkable teaching abilities.

We are continuing to develop Professional Science Master's programs that are designed to allow students to move into exciting and growing technical fields following a two year program offered principally during evenings and weekends. In addition to the Department of Biological Science's successful Master's in Biotechnology Program, we have submitted a proposal for a new program in Medical Device Project Management that represents a partnership between the colleges of Science and Business. We hope to admit the first class for this program in the fall of 2008.

Several searches are ongoing, but we have already hired some world-class faculty in the departments of Meteorology (Drs. Menglin Jin and John Abatzoglou) and Mathematics (Dr. Plamen Koev). We are excited to have these additions to our faculty and look forward to their contributions to our teaching and research programs.

We are very pleased to welcome our new Development officer, Carol Beattie, who joined the university advancement staff in January. Carol has extensive experience in industry, consulting and working with non-profits such as the Children's Health Council. Young Audiences of Northern California, and the San José Art Museum. Carol will be working with our advancement council and focusing on establishing connections with individuals interested in supporting the college.

Finally, I would like to invite all of you to attend our annual Student Research Day, which will be held this year on Friday May 2 starting at 10 AM. This is an outstanding opportunity to see what kind of research is being conducted by COS undergraduate and graduate students. This year the COS student advisory council, in association with the COS student clubs, will be hosting a barbeque lunch in the grill pit next to Duncan Hall. Attendance is free to those that attend the poster session. If you haven't been on campus for awhile, this would be a great opportunity to pay us a visit.

GEOLOGY DEPARTMENT: : “THE MILLERS”

EVOLUTION OF TECTONICS AND MAGMA SYSTEMS

Professor Bob Miller and Jonathan Miller (no relation) in the Department of Geology have collaborated for 10 years on numerous research projects that have integrated field and laboratory studies focusing on the tectonic evolution of mountain belts and the genesis and evolution of magma (molten rock) systems. This research has utilized natural field laboratories in a variety of locations, including the Washington Cascades, Sierra Nevada Mountains (in Yosemite National Park), southern Nevada, and the Mojave Desert.

A critical aspect of these studies has been the involvement of more than 20 students conducting their M.S. thesis research and 5 undergraduate students carrying out

two undergraduate students made presentations in March at a Geological Society of America Meeting in Las Vegas.

The students and professors have enjoyed conducting field research in scenic mountain and desert country, most of which is in national parks, national forests, and other federal government lands. The field work routinely involves camping and in many cases backpacking, and one of the students accessed rock outcrops via kayak on a large wilderness lake.

The “Millers” (as they are sometimes referred to by their department colleagues) and their students have been supported by more than a million dollars in grants from the National Science Foundation and the U.S. Geological Survey. This funding has enabled the hiring of many other undergraduate and graduate students to assist in the laboratory and field, and given these students valuable research experience beyond that received in the classroom. The work of the professors over the last 10 years has resulted in more than 25 publications in refereed journals and guidebooks, some with students as co-authors or first authors.

Jonathan and Bob have attempted to create a “research family” atmosphere for their stu-



“THE MILLERS”
JONATHAN MILLER (LEFT)
ROBERT MILLER (RIGHT)

dents by hosting potluck dinners each semester and by having a weekly brown-bag lunch where a recent journal article related to research being conducted by someone in the group is discussed. Bob and Jonathan have found great satisfaction in seeing their students develop as scientists. Some of the students have continued on to Ph.D. programs at MIT, University of Wisconsin, University of Southern California, and the University of California-Santa Cruz. Many of the students have taken jobs in local geological consulting companies and five of Bob's and Jonathan's students are currently professors or instructors at universities and community colleges.



senior research projects. These students have all presented the results of their research at national or regional meetings of the Geological Society of America and American Geophysical Union, and two M.S. and

MOSS LANDING MARINE LABS MICHAEL GRAHAM: DISCOVERY OF NEW KELP ENVIRONMENT



Dr. Michael Graham, professor of Phycology at the California State University's Moss Landing Marine Labs, and colleagues have found kelp (*Eisenia galapagensis*) in

oceanic regions previously thought to be incapable of supporting kelps, making national news in late 2007. Kelp is the term given to canopy-forming brown algae, which play an essential

role in offshore biology as foundation species that support a unique ecosystem—the kelp forest. Kelp forests can be the home of hundreds of different species, including invertebrates, fish, mammals, and other algae. They are considered to be one of the most productive and biodiverse of the ocean's communities.

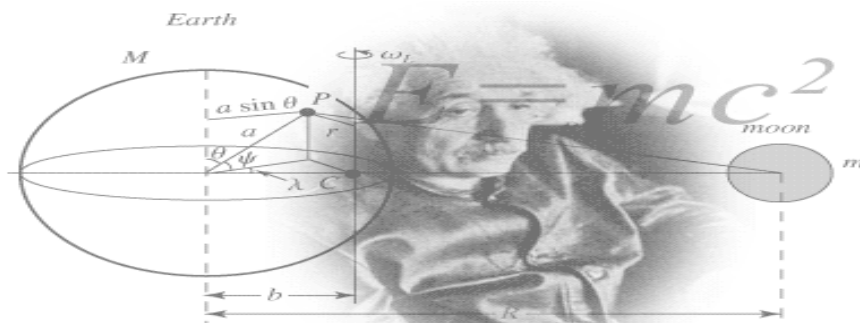
CONTINUED ON PAGE 8...

2007 UPDATES

DEPARTMENTS OF PHYSICS AND ASTRONOMY

Associate Professor Michael Kaufman is the Director of the Physics Department's NSF-funded *Research Experiences for Undergraduates* program. The program annually supports participation by 10 students in faculty research projects. SJSU students participate year round, while 5 students from national search participate in a 10-week intensive summer program. This year's projects included analysis of Spitzer Space Telescope data, detection of pre-earthquake signals, calculation of meteorite trajectories, complex classical mechanics, and analysis of cuprate superconductors. Kaufman's student Mark Cordier presented results of their research on star formation at the American Astronomical Society summer meeting in Honolulu. In April, Kaufman was a lecturer at the Centre de Physique in Les Houches, France, at a workshop for astrophysics graduate students and postdocs who will use the Herschel Space Observatory, a large space-based infrared telescope scheduled for launch in late 2008. Kaufman is a member of several guaranteed-time teams that will get data from Herschel during its first months of operation. Kaufman is also a member of the scientific organizing committee and a speaker at the upcoming workshop "Far-Infrared and Submillimeter Emission of the Interstellar Medium: Models meet extragalactic and Galactic Observations," to be held Nov. 5-8 in Bad Honnef, Germany. See <http://www.ph1.unikoeln.de/FIR2007/MainFrame.html> for details.

During spring break 2007, Assistant Professor Monika Kress was a participating scientist in "Spaceward Bound, an educational program organized at NASA Ames in partnership with The Mars Society, and funded by the Exploration Systems Mission Directorate at NASA Headquarters. The focus of Spaceward Bound is to involve teachers in authentic fieldwork so that they



can bring that experience back to their classrooms and assist in the development of curriculum related to human exploration of remote and extreme environments. This year, Spaceward Bound was held at Cal-State's Zzyzx Desert Studies Center in the Mojave Desert. Kress took 6 students from her Astrobiology class to this event, for a total of 9 participants from San Jose State University. Kress is also a co-investigator of a 5 year, ~\$5M grant awarded by NASA to the Virtual Planetary Laboratory. This team, lead by Dr. Victoria Meadows of the University of Washington, had been a member of the NASA Astrobiology Institute since 2001. Their proposal, Exploring the Habitability and Biosignatures of Extrasolar Terrestrial Planets, was one of only 4 proposals selected in this competition.

Professor Alejandro Garcia is co-organizer (with Dr. M. Gallis of Sandia National Laboratory) of a workshop entitled "DSMC: Theory, Methods and Applications," to be held in Santa Fe, New Mexico from September 20-October 3. The goal of the meeting is to bring together developers and practitioners of the Direct Simulation Monte Carlo (DSMC) method. Talks span all DSMC-related work, including theoretical foundations, validation, verification, convergence, computa-

tional efficiency, hydrodynamic fluctuations, transient flow, flow instability, and algorithm development. Talks on applications of the DSMC method are also welcomed in topic areas such as aerospace, micro-scale flows, nano-scale flows, plasmas, gas-phase reactions, phonon transport, dense gases, liquids, granular flow, agent modeling, traffic, and planetary atmospheres.

Assistant Professor Natalie Batalha (Physics) is the director of the UARC Systems Teaching Institute (STI) at NASA Ames Research Center. The STI is a contract managed by San Jose State University whose objective is to create student programs and offer student resources that a) offer practical training to students pursuing careers in STEM fields and b) support collaborations between university and NASA scientists. The STI piloted the GSIP program (Graduate Student Internship Program) last year. In 2007, the STI budget received a 30% increase in order to double the size of GSIP for summer 2007. The STI recruited students nationally and received over 75 applications for 8 positions. One of these positions was awarded to SJSU

CONTINUED ON PAGE 6...

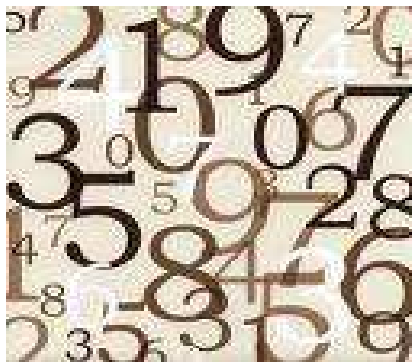
MATHEMATICS DEPARTMENT NEWS AND UPDATES

Changes in Applied Math at San Jose State

Before Fall 2002 the Math and CS departments were combined as one department and most of our energies went towards maintaining the computer science curriculum for roughly 1500 CS majors. After the Math Department split from the CS department in Fall 2002, one of the Math Department's main goals was to devote more time towards upgrading its applied math programs. At that time the Math Dept. had two options for our applied math majors, a BS Applied and Computational Math with an Emphasis in Applied Math and a BS Applied and Computational Math with an Emphasis in Statistics. In Fall 2002 we had 23 BS Applied and Computational Math Majors but the number of applied math majors has increased every year since then and the number of majors has roughly doubled in the last five years.

New Interdisciplinary Programs

In 2005/06 a third new BS Applied and Computational Math Emphasis in Economics, Finance, and Actuarial Science was approved. It has already proven to be a popular option for the students. It has been little more than a year since this program was approved and already the number of majors pursuing this option is almost equal to the number of majors pursuing the other two applied math options.



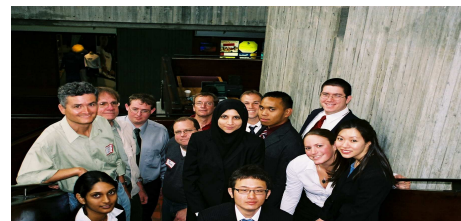
A career as an actuary is one of the most lucrative careers that someone with good math skills can pursue. Actuaries evaluate risk for various businesses and industries. Presently we have about 24 majors pursuing the Emphasis in applied math, 17 majors pursuing the Emphasis in statistics, and 14 majors pursuing the Emphasis in Economics, Finance, and Actuarial Science. Mathematical Biology is now becoming a very active area of research and we may work towards adding a minor in Mathematical Biology and eventually a BS Applied and Computational Math Emphasis in Mathematical Biology to our applied math options in the near future.

New Applied Math Graduate Programs

The Math Department recently approved two new emphases for our Masters programs, an MA Math Emphasis in Statistics and an MS Math Emphasis in Applied Math. Eventually we hope to create a Professional Science Masters Degree in Statistics and a Professional Science Masters degree in Applied and Computational Math. The Professional Science Master's (PSM) Degree is an innovative two-year graduate program created to meet industry needs by providing math, science and engineering graduates the skills essential to excel in today's high-growth technical industries. PSM programs also feature internships, which provide essential industry-based experience and exposure. We feel that programs of this kind will be a good fit with our Center for Applied Math, Computation, and Statistics (CAMCOS) program, which gives students experience working together on a problem sponsored by business, government, or industry.

Center for Applied Math, Computation, and Statistics (CAMCOS)
CAMCOS started out in 1983 as the

Applied Math and CS Clinic and was directed by Jane Day, who modeled this program after the Applied Math Clinic at Harvey Mudd College. In CAMCOS, a team of students under the supervision of a professor work on a problem provided by a sponsor in business, industry, or government. In the past we have had CAMCOS projects sponsored by IBM, Intel, Lockheed, Hewlett-Packard, GTE Sylvania, NASA Ames, and the Dept. of Energy, among others. The students working on a CAMCOS project receive 3 units of credit for Math 203 and are responsible for giving an oral presentation and writing a report describing their research results at the end of each semester. At the present time Tim Hsu is the CAMCOS director and he tries to arrange for two CAMCOS projects each semester.



CAMCOS team, supervisors and NASA Scientists

This semester CAMCOS is running a student research project on the causal set approach to quantum gravity. The project, guided by Dr. Jeffrey Scargle from NASA Ames Research Center in Mountain View, involves a team of five students supervised by the mathematics professor Slobodan Simić. Quantum gravity is the field of theoretical physics attempting to unify quantum mechanics, which describes three of the fundamental forces of nature with general relativity, the theory of gravity. In causal set theory (pioneered by the physicist Rafael Sorkin), space-time is considered as discrete and equipped by a relation of partial order, representing causal relations among events.

CONTINUED ON PAGE 5...

MATH NEWS AND UPDATES

Continued from page 4

The main goal is to use the so called "sum-over-histories" (or Feynman path integral) approach, invented by Richard Feynman for solving the Schroedinger wave equation of quantum mechanics, to study the probability amplitude of a particle moving through a causal set as a function of



its energy. With assistance from Drs. Scargle and Simic, the students are expected (among other things) to implement causal sets as graphs (with various choices of weights attached to the edges) using Matlab, perform computer experiments, and interpret their results. The project will result in a written report and an oral presentation to faculty, students, family and friends in May.

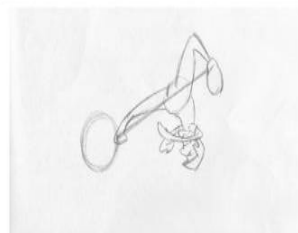
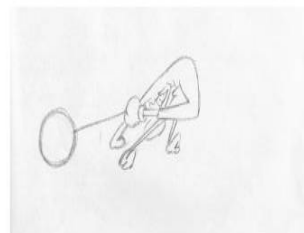
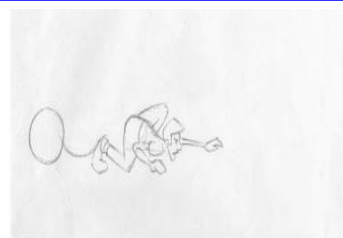
PHYSICS OF ANIMATION

The field of animation, including feature-length films and video game design, is a multi-billion dollar industry. Besides the entertainment industry, modern animation is used extensively in advertising, training, education, scientific visualization, and many other fields. San Jose State's Animation/Illustration Program in the School of Art and Design is one of the premier programs in the nation, attracting students nationally and internationally with over 400 undergraduates currently majoring in the program. SJSU animation consistently wins prestigious national and international recognition at exhibitions, festivals, and screenings (e.g., "Fumi and the Bad Luck Foot" was selected for the 2006 Sundance Film Festival) and many graduates currently work at Dreamworks, Disney, ILM, Electronic Arts, and other major animation and gaming companies.

Though animators may bend, stretch, even break the laws of physics for comic or dramatic effect, they are keen observers of the physical world. Animation artists carefully study the motion of objects, the appearance of light and shadow, and the properties of materials. They fill their sketchbooks with these observations, in the same fashion as their predecessors, going back to Leonardo da Vinci. Unfortunately, artists sometimes develop the same false notions as pre-Renaissance scientists, such as believing that heavy objects fall faster than lighter ones. This occurs because their training within the standard art curriculum does not include physics.

At present there is little overlap between art and science in the typical university curriculum and physics courses for visual artists are extremely rare. To address this need, Professors Alejandro Garcia (Physics), Alice Carter (Animation/Illustration), and Courtney Granner (Animation/Illustration), in collaboration with Martin McNamara of De Anza college, have been awarded a grant from the National Science Foundation to create content for "Physics of Animation" lectures for art students. Rex Grignon, head of character animation at Dreamworks, has agreed to serve as the external evaluator and consultant on the project.

The topics in "Physics of Animation" are those most relevant to character and effects animation and differ significantly from the topics in the traditional undergraduate physics sequence. For example, common character animation sequences, such as jumping, pushing, fighting, (including punches and kicks) are analyzed in terms of the action-reaction and the work-energy concepts. In the same way that learning anatomy helps artists draw realistic people, learning physics will help them animate realistic worlds. The impact of "Physics of Animation" is already recognized by industry professionals. Jack Lew, Global University Relations Manager for Art Talent at Electronic Arts writes, "This class in particular is both innovative and timely. In the interactive industry (games) where technology is driving our growth and challenging how we work, the traditional computer animation artist would be well served if he/she understands thoroughly the physics principles."



DEPARTMENT OF PHYSICS AND ASTRONOMY 2007 HIGHLIGHTS

(CONTINUED FROM PAGE 3)

student Massoud Fazal (Meteorology). The STI also managed a new program this summer: the Small Spacecraft Summer Study Program (S4P). The UARC solicited proposals from UC to develop a low-cost scientific mission in collaboration with the NASA Ames Small Spacecraft Center – a mission that is relevant to the NASA strategic plan and that has a high probability of being selected for flight. The proposal was awarded to Space Sciences Laboratory (SSL/UCB) to develop the Lunar Science Orbiter. Six students were selected to participate in the summer concept design study. While these students were also recruited nationally, three of the six slots were offered to students in the SJSU Aerospace department.

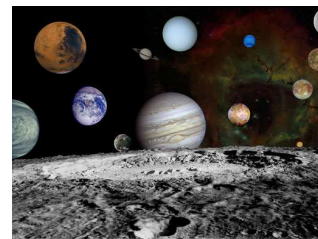
Associate Professor Ken Wharton presented his research results on time-symmetric quantum mechanics at conferences in Vaxjo, Sweden (June) and San Diego, CA (August).

In the past six months, Professor Brian Holmes, an expert in the physics of musical instruments and an accomplished composer, has received commissions to write new music for Castilleja School (Palo Alto), the Mission Chamber Orchestra, the Contra Costa Children's Chorus, Vivace Youth Chorus (San Jose), the East Central Illinois High School Honors Chorus, and the Parkersburg (WV) Choral Society. New music was premiered by the Peninsula Women's Chorus and by the elementary chorus of Pinewood School. In addition, one of his pieces is a finalist in this year's Ithaca College Choral Composition Contest. The Walbrook Singers of London, directed by Paul Ayres, will include one of his carols on a recording to be issued this Fall.

Dr. Beyersdorf has introduced podcasting to the classroom, recording all class lectures and posting them for students to review at their leisure. Access to the podcasts is not limited to enrolled students; the recordings have been downloaded in at least 13 countries according to server statistics, allowing classes to reach a truly worldwide audience. The podcasts are available at <http://www.sjus.edu/faculty/beyersdorf/>.

San Jose State University was accepted into the LIGO science collaboration in the fall of 2006. By virtue of this membership, faculty and students will participate in development of technologies used in LIGO and have access to data from LIGO, the Laser Interferometric Gravitational Wave Observatory the most sensitive instrument for observing cosmological gravitational signals that contain information about the early universe.

Professor Ramen Bahuguna filed a provisional patent application in May of this year. The title is: "A fingerprint sensor using a spectral filter and a holographic optical element." Bahuguna directs The Institute for Modern Optics, which collaborated with the College of Engineering to start an MSE Degree program with emphasis in Optoelectronics, for Lockheed Employees. The courses are taught at Lockheed. Professor Bahuguna and Adjunct Professor Paul Bolton taught some of the courses. A similar program is being started at KLA-Tencore. On September 20, 2007 the Institute for Modern Optics participated at the Science Educator's Day sponsored by the Optical Society of America (OSA), UC Berkeley's Student Chapter of OSA, and Stanford University's OSA chapter.



CHEMISTRY'S JOHN LOGAN: POLYMER DYNAMICS PROJECT



John Logan joined the faculty of the Department of Chemistry in the Fall of

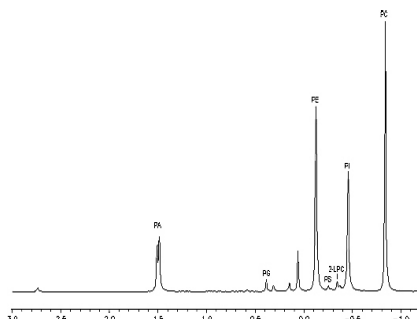
2005. His research group focuses mainly on the dynamics of polymers on surfaces, but other projects include the characterization of catalytic polymerization reactions, studying polymer diffusion in bulk melts and on surfaces, and developing new techniques for data analysis and acquisition of nuclear magnetic resonance experiments.

The overall goal of his group's research is to observe and understand the dynamics of polymers on surfaces. The polymers used in these studies are analogs to the lubricants used on hard disk drives. Hard disk drives have a molecularly thin layer of lubricant that protects the read/write head from the physical disk surface. This layer of lubricant is essential for the long life of the device. A full understanding of the dynamics of the polymers could be used for the rational design of even better lubricants.

The main technique used to observe and quantify the dynamics of the polymer molecules is NMR spectroscopy, the same fundamental technique that magnetic resonance imaging (MRI) is based



upon. Several different experiments are performed to characterize each sample. One of the experimental observables is an *order parameter*, which is a measure of the average of the local motions of the atoms along the polymer back-



bone. The order parameters have been measured on a variety of samples with very different amounts of the polymer on the surface (ranging from several nanometers thick films down to sub-monolayer coverage). With many of the experimental measurements already completed, recent efforts have focused on computations to help explain and support the observed data.

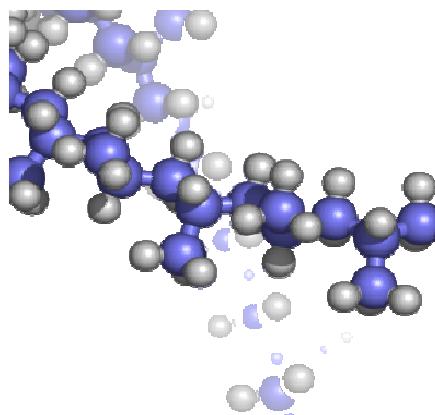
The computations fall in two broad categories (1) molecular dynamics (MD) simulations, and (2) ab initio quantum chemical calculations. The MD calculations are used to simulate the dynamics of a molecule using short time steps. Next, the MD simulation output contains the orientation of the polymer as a function of time. And that information is used to compute the order parameter: the quantity that's measured experimentally.

The ab initio quantum chemical calculations are also used to assist in the interpretation of the experimental data, but they are used in a very different way than MD simulation data. The quantum chemical calculations provide a few of the parameters

that are very difficult to measure experimentally, but are necessary in the analysis of some of the experimental spectra. A successful outcome of these calculations will allow additional information to be measured from a different series of experiments, helping to fill-in the "big picture" of how the molecules move on the surface.

A model for the order parameter as a function of polymer coverage is being developed, and it is being tested against the experimental data, and once it is available it will be tested against the MD data. Various parts of this work have been presented at several conferences (oral and poster presentations), and a manuscript is currently being prepared for publication.

The polymer dynamics project is a collaborative effort between the Logan group and several scientists at IBM's Almaden Research Center in San Jose. Several of Dr. Logan's students have been supported by the SJSU/IBM Research Experiences for Undergraduates (REU) program (Principle Investigator: Prof. Joe Pesek, Chemistry, SJSU). These students have collected data for the polymer dynamics project, as well as a polymer synthesis project involving the investigations of different catalysts.



METEOROLOGY'S DR. ROBERT BORNSTEIN: RECIPIENT OF HELMUT LANDSBERG AWARD

BY: KRISTINA DRAGOVIC



Dr. Robert Bornstein has had the privilege of being named the first American recipient of the American Meteorological Society's (AMS) Helmut Landsberg Award. He has been recognized "for over three decades of international leadership in the field of urban meteorology, including fundamental contributions in the areas of air pollution meteorology, urban heat island dynamics, and mesoscale modeling of urban areas." Dr. Bornstein is a retired Professor in the Meteorology Department at SJSU, currently participating in the Faculty Early Retirement Program. He specializes in boundary layer and dispersion meteorology. Boundary layer meteorology includes the study of the methods by which cities create their own urban climate, and dispersion meteorology refers to the spread of pollution within and around cities.

His findings were made utilizing the research information he gathered in the process of receiving his doctorate at New York University. Dr. Bornstein received his undergraduate degree from City College of New York (CCNY), a college which has shaped the minds of eight Nobel Prize winners. Dr. Bornstein obtained his own data from his work with his thesis advisor, who passed away and left him all of his work.

CONTINUED ON PAGE 9...

GRAHAM'S KELP DISCOVERY

...CONTINUED FROM PAGE 2

Kelps are relatively common along rocky coasts in the temperate and cool waters of the Pacific, Atlantic, and Indian Oceans. These algae are restricted to rocky bottoms suitable for permanent attachment. They have previously been thought to be restricted by two further criteria: (1) shallow waters (30 - 40m or less) where sunlight needed for photosynthesis is able to penetrate the water; and (2) cool coastal waters where nutrients are delivered from the depths by upwelling. The discovery of deep-water kelps violates both of these long-standing assumptions, but was not a serendipitous discovery—Dr. Graham and colleagues carefully calculated where they might find such organisms prior to their expedition. Dr. Graham's hypothesis was that deep tropical waters would be able to support kelp growth because the clarity of the overlying tropical surface waters would lead to transmission of enough light for photosynthesis. Unlike the surface waters, however, temperatures at depth would be cool with sufficient saturation of nutrients. An experimental model was mathematically created by comparing the physiological requirements for successful kelp growth

with an integrated oceanographic map of light, temperature, and nutrient levels, and used to predict the locations of kelp forests. The model was correct in pinpointing known populations of temperate kelps and was then tested by examining predicted novel locations in the Galapagos Islands. Eight localities were explored—all had kelp.



Graham Displays Previously Thought "extinct" Kelp

Patches of deep-water kelp species had previously been found in a few locations, but not in such great densities. In the surveys conducted by Dr. Graham's team, kelp densities continued to increase with increasing depth up to the maximum depth that can be sampled by SCUBA (60m). Densities are theorized to have increased even further up to 200m depth, but were not directly observed. In the past, rare deep-water populations were hypothesized to be relics of shallow-water populations that had existed during the

cooler temperatures of the last glacial period. These newfound populations suggest that kelp systems in deeper tropical waters are thriving and may be far more common than previously thought. The existence of viable, potentially ancient populations may be the missing link in describing the connection between lineages of the kelps in the Northern and Southern Hemispheres.

In addition to the kelp, species of both invertebrates and algae known to be components of temperate kelp forests were found in the Galapagos, stimulating the question of whether these deep-water forests could be analogous to temperate forests and play critical roles in the biodiversity and production of the surrounding region. These ecosystems will likely be a hotbed for study in the coming years because they are potentially equivalent to temperate forests in function, yet very different in location. Furthermore, their depth will expose them to different oceanic conditions than those experienced by the coral reefs found in shallow tropical waters—a distinction that could have great significance with regard to the effects of climate change.

For details see:

Graham MH, Kinlan BP, Druehl LD, Garske LE, Banks S (2007) Deep-water kelp refugia as potential hotspots of tropical marine diversity and productivity. *Proceedings of the National Academy of Sciences* 104:16576-16580.

BORNSTEIN WINS HELMUT LANDSBERG AWARD

...CONTINUED FROM PAGE 8

The data now resides at SJSU. About 20 graduate students working under Dr. Bornstein analyzed and reproduced (by use of computer based models) this data, successfully illustrating the fundamentals of urban heat island dynamics. While most meteorologists will analyze either observations or computer simulation results, Dr. Bornstein has quite astutely utilized both to fully understand urban climatology, as the observations can most clearly be understood through computer simulation, and vice versa.

Through his original ideas, Bornstein has been able to prove that previously accepted beliefs of urban effects on weather are actually too simple. Rather than focusing on averages of all the data that generalizes an entire urban area's climate, he has divided the data and found that various effects of urban areas have canceling effects upon one another. His work focuses upon temperatures, winds, storms (specifically thunderstorms) and on the various interactions these different parameters have upon the city. In actuality, the urban boundary layer created by the city has been proven to deter storms as they split around the cities they encounter, disproving the accepted belief that cities and their climate changes were too small to have an effect on the weather. Overall his work has been very influential in the understanding of urban climate: He continues to work to further clarify the effects cities have upon their surrounding climate.



AMS 88TH ANNUAL MEETING,
NEW ORLEANS, LA

BIODIVERSITY CENTER

BY: ANA DRAGOVIC

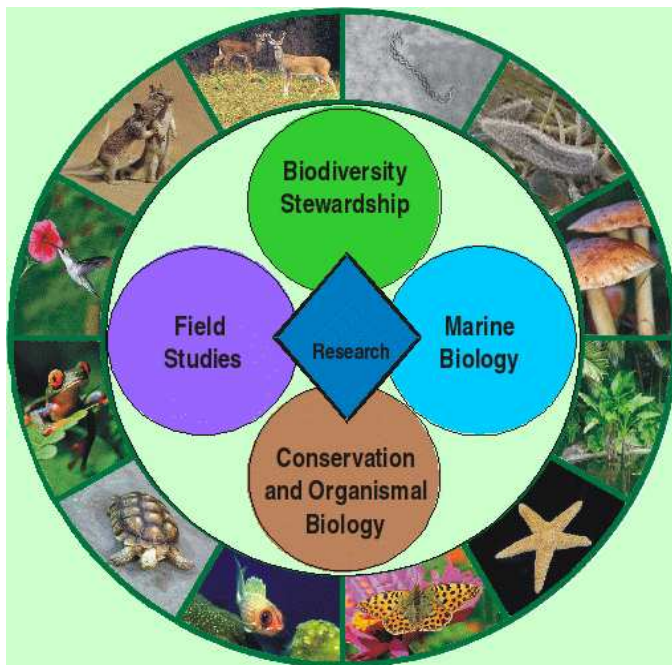
Biodiversity is the rich variation in life forms on our planet; it includes diversity in genetic composition, species and ecological systems. Many factors affect biodiversity not the least of which is alteration or loss of habitat through the influence of man. The role

of the Biodiversity Center is to promote research, public awareness and education directed toward preserving the diversity of life.

The Biodiversity Center is located in Duncan Hall 348. The room previously was the invertebrate laboratory and has now been converted to be a phenomenal resource for students and faculty, alike. The center has several computers equipped to run Geographical Information Systems (GIS) that researchers will use to investigate data from field studies. GIS will greatly contribute to the success of the center because it provides an invaluable analytical tool for research. It will also facilitate an environment where students and faculty can come together to discuss issues, work on research and solve problems. In addition, it serves as a conference room and will house the office of the Director, Dr. Jeffrey Honda. The Biodiver-

sity Center also serves as a link to the Biology Departments three museums. Databases of the museums' holdings are now available to the public and research scientists. This includes catalogued species collections of over 6,500 insect species, over 15,000 plant varieties and over 4,000 bird specimens. Currently, the center is still in the process of becoming an Organized Research Unit (ORU) to be able to conduct various research projects with different institutes and organizations. In the meantime, it is serving in an advisory role with: the Department of Fish and Game (DFG) and DeAnza College. The DFG is utilizing the exceptional skills and knowledge from the faculty that are a part of the center to help with various decisions that impact our local environment. The faculty include: Dr. Jeffrey Honda (Director), Dr. Shannon Bros (Associate Director), Dr. Vida Kenk, Dr. Michael Kutilek, Dr. Susan Lambrecht, Dr. John Matson, Dr. Elizabeth McGee, Dr. Leslie Parr, Dr. Sabine Rech, Dr. Jerry Smith, as well as Julie Phillips, the Morgan Family Chair of Environmental Studies at De Anza College, and Pat Cornely, the Director of the Kirsch Center for Environ

...CONTINUED ON PAGE 10



BIODIVERSITY CENTER

...CONTINUED FROM PAGE 9

mental Studies at De Anza College.

The diverse group of faculty associated with the center have many biodiversity interests outside of teaching and research. For example, Dr. McGee is currently involved in a summer outreach program that teaches grade school students about conservation of the environment during the summer months. Dr. Honda is involved in local insect fairs aimed at educating young children and their parents about insects and their impact on the environment.

The College of Science will benefit from the Biodiversity Center in several ways. First, with a large focus on outreach, the center looks to create a greater awareness to the general public and community about biodiversity and all of its implications. Secondly, it will attract students that are interested in this field to attend SJSU. Lastly, the many grants that are going to be associated with the center will generate revenue for the college and open up research positions for faculty and for students.

For more information, visit the website at:

<http://www.biology.sjsu.edu/biodiversity/AppMain.html> sbros@science.sjsu.edu.

LATE BREAKING NEWS!

FROM DEAN PARRISH

As we were doing some final tweaking on the newsletter, I learned about two more grant successes in the college. A MARC (Minority Access to Research Careers) grant submitted by Herb Silber in the Department of Chemistry was funded by the National Institute of Health for \$1.5 Million over three years. The MARC grants provide research opportunities for undergraduate and graduate students from underrepresented groups who are planning to enter doctoral programs in biology or chemistry. The same day, we learned that a proposal submitted by the Department of Biological Sciences (with Dr. Julio Soto as Principal Investigator) to the Howard Hughes Medical Institute was funded for \$1.3 Million. The proposal, which was a team effort by the biology faculty, provides research opportunities for 2 cohorts of 20 sophomore students, targeting underrepresented students. It also involves faculty support, curricular development, and development of faculty and facilities. Faculty involved with the MARC, Howard Hughes, RISE, and STEP grants will be working together closely in their shared goals of providing substantive research experiences for undergraduates and graduates (particularly those from underrepresented groups), transforming curricula, and promoting and tracking student success. Kudos to Drs. Silber, Soto, Singmaster, Scharberg, Walker, and the many others that contributed to these efforts.



**COSAC:
COLLEGE OF SCIENCE
ADVISING CENTER
BY: DR. MAUREEN SCHARBERG**

The College of Science Advising Center (COSAC), located in DH 213, is in the beginning stages of providing academic advising and related services to College of Science majors. Our main goal is to increase student retention and success for our majors. In partnership with departments, we will provide academic advising and support for all frosh and transfer students, beginning in Summer 2008. Please note that COSAC is made possible by a NSF STEP grant with Dan Walker as PI and Maureen Scharberg as Co-PI.

Currently, Science 2 Peer

Advisors are available in the College of Science Advising Center to meet with students and discuss study strategies and time management skills as well as provide referrals to other SJSU academic and student support services. They are also available for tutoring lower division biology and chemistry courses. Their hours of availability are posted outside of DH 213.

As a pilot program this semester, COSAC is working with mathematics faculty who teach "gateway" courses to identify those students who are struggling in their math classes. We are referring these students to tutoring as well as inviting these students to meet with academic advisors and the peer advisors. We plan to expand this service to other College of Science "gateway" courses in the future.

At the SJUS Career Center, Melodie Doyle is an intern specializing in careers in science. Her drop-in hours are on Wednesdays, from 1-6pm in Clark Hall 128. She can assist students in career planning, career advice and career counseling. She also will be providing two workshops to assist students in choosing a major: Wednesday, April 9 from 3:30-4:45pm and Tuesday, May 6 from 10-11:15am. Both workshops will be held in the Career Center, MOD F.

The College of Science Advising Center is located in DH 213. Our hours are Monday through Friday from 9-5pm. Please stop by!

If you have any questions regarding COSAC, please e-mail Maureen Scharberg @ mscharberg@gmail.com

NEW ADDITIONS TO THE COLLEGE OF SCIENCE STAFF

5 new staff members have joined the College of Science. We would like to welcome the following...

DEAN'S OFFICE
CHRISTINA DE LA ROSA
ADMINISTRATIVE
ASSISTANT

CHEMISTRY
KHOUNG NGO
INSTRUCTIONAL
SUPPORT TECHNICIAN II

COLLEGE OF SCIENCE
FRED CORVI
COS ACADEMIC ADVISOR

**MOSS LANDING
MARINE LABORATORIES**
GARY ADAMS
FACILITY SUPERVISOR

COMPUTER SCIENCE
KEVIN ROSS
OPERATING SYSTEMS
ANALYST



THE PROVOSTS OUTSTANDING ASSESSMENT AWARD

BY: DR. STEPHEN BRANZ

The popular press and politicians often speak of **accountability** in education. For higher education, the buzzword is **assessment**. (It all boils down to an assurance that tax dollars are being well spent.) It is no longer sufficient to count the number of books in the library or look at the list of courses taught in order to judge the quality of a program. Accrediting agencies are demanding that we assess *what students learn, not merely what they have been taught*. This may seem to be a subtle distinction, but nonetheless it is a distinction that is of increasing importance in higher education nationwide. University faculty and administrators are being asked to collect and analyze data on student learning and, when necessary, modify assignments or curricula to better serve student needs, hopefully leading to higher retention and graduation rates.

While all faculty are ex-

pected to participate in these assessment activities, there are some faculty who have shown exceptional leadership in this committee work. For the past two years, Provost Carmen Sigler has asked each college to select a recipient for the Outstanding Assessment Award. The winners of these awards are recognized at an annual Spring Conference devoted to "Teaching and Learning at SJSU."

Dean Parrish in consultation with the department chairs selected **Robert ("Bob") Hyde** as the inaugural recipient of this award from the College of Science in Spring 2007. Professor Hyde joined the Department of Biological Sciences in 1984. He was instrumental in establishing a culture of assessment in his own department and served as the College of Science facilitator to help other departments set up and implement assessment plans of their own. Professor Hyde

FERP'ed (Faculty Early Retirement Program) as of Fall 2007.

For Spring 2008, the College selected **Peter Beyersdorf**, an Assistant Professor in the Department of Physics since 2005. Dr. Beyersdorf grasped the essentials of assessment early on and put an assessment plan into practice at a time when many faculty in the College of Science were reluctant participants at best. The Department of Physics has created a practical model that other departments might well emulate.

The faculty in the College of Science were not trained in the social science of measurement and assessment of student learning. Professors Hyde and Beyersdorf have studied and developed expertise with assessment. Their leadership and sharing of their expertise has been of enormous benefit to the students and faculty of our College of Science.

Congratulations!



DR. KAREN SINGMASTER

2008 OUTSTANDING PROFESSOR AWARD

Karen A. Singmaster, chemistry professor, is the recipient of the 2007-2008 Outstanding Professor Award at San José State University. This award, which recognizes excellence in teaching, is one of the top four faculty awards given annually by SJSU.

Karen is a committed and passionate professor who gives her all to the advancement of education," President Don W. Kassing said. "She is not merely an insightful scholar and innovative researcher, she is also a dedicated, hard-working educator whose top priority is student success. She is an inspiration to the students

as well as her colleagues."

A faculty member since 1988, Singmaster's unique teaching techniques attract students to her general chemistry courses. One of her students said, "Dr. Singmaster stands out as a beacon to professors and students alike in that she understands and can explain the fundamentals of everything she teaches, encourages interest in the subject matter, reaches out to students in need of extra help, and instills in all a desire to seek knowledge."

Singmaster is the SJSU program coordinator for a National Science Foundation Alliance for Minority

Participation grant that funds a two-week chemistry prep course and peer-facilitated workshops. The program targets students traditionally underrepresented in the fields of science, math, engineering and technology.

"Karen hires and trains the peer facilitators for these workshops while coordinating all grant activities," said Stephen Branz, associate dean of the College of Science. "The workshops are the most cost-effective intervention on campus to help students get through their gateway courses and success in their chosen fields."

Singmaster was coordinator and registrar for "Expanding Your Horizons," a conference that encourages young women to pursue science and math, and served for eight years as chair of the Minority Access to Research Careers Steering Committee. Singmaster has been awarded the Bruce Mahan Memorial Teaching Award by the University of California, Berkeley, where she earned her Ph.D., and a Meritorious Performance and Professional Promise Award by SJSU in 1990, among other teaching honors. She has a bachelor's degree from Universidad de Puerto Rico in Rio Piedras.

COLLEGE SEEKS TO GRADUATE MORE STUDENTS USING A NEW \$2M GRANT

BY: DAN WALKER

The College of Science (COS) embarked on an important new project beginning Fall 2007. Most universities in the country, including SJSU, lose about 50% of the students who initially declare majors in science, mathematics, and engineering prior to graduation. Heeding the calls from local technology industries and from the National Science Board to increase the supply of highly skilled, technological workers, the College has adopted a multi-prong approach to increase graduation rates to about 75%.

Resources to support the new project come from two sources: a new, two million dollar grant from the National Science Foundation; plus support from the COS Dean's Office to expand the number of professional student advisors in the College and expanded facilities to house the project staff. The NSF grant is funded through the *Science, Technology, Engineering, and Mathematics Talent Expansion Program* (STEP) initiative. The two million dollars will be distributed over a five-year period. Based on the results of research studies of student retention/attrition, we are in the process of initiating several interventions that should be effective in improving student performance, and, ultimately, graduation.

We have just opened the new College of Science Advising Center (COSAC) located in Duncan Hall of Science. The center has a number of functions, most important of which is to advise all incoming science and math majors, both freshmen and transfer students. The Center will track these College of Science students during their first two to three semesters at SJSU to identify those who are struggling with their studies. The advising staff will personally contact such students and arrange an advising session to help the student.

The grant also contains funding to improve the educational experiences in our large, so-called *gate-keeper*, courses (i.e., those introductory level courses with average student GPA's of 2.0 or less). Besides offering student tutorial services for these courses, the faculty who teach in these courses will be provided with professional development opportunities so that they can revise and enrich their courses in ways that will help the students to be more successful. During this first year of the grant, the focus is on the faculty of the Mathematics Department who teach the Calculus Sequence, especially in the Pre-calculus (Math 19) course that is the first in the sequence for most students. Revised Math 19 courses will be offered in Fall 2008.

The grant was written by, and the new project is being directed by, Professors Dan Walker and Maureen Scharberg, under the auspices of the COS Dean's Office.